

Abstract

An optical interrogation system and a GCW sensor are described herein that are used to determine whether a biological substance (e.g., cell, molecule, protein, drug) is located in a sensing region of the GCW sensor. The optical interrogation system includes a light source, a polarization modulator and a detection system. The light source outputs a polarized light beam and the polarization modulator modulates the polarized light beam and outputs a polarization-modulated light beam. The GCW sensor receives and converts the polarization-modulated light beam into an amplitude modulated light beam that is directed towards the detection system. The detection system receives the amplitude modulated light beam and demodulates the received amplitude modulated light beam by responding to signals at a modulation frequency of the polarization-modulated light beam and ignoring noise affecting the signals outside the modulation frequency to detect a resonant condition (e.g., resonant angle, resonant wavelength). The detected resonant condition that has a one-to-one relationship with the refractive index of the superstrate containing the biological substance is analyzed to determine whether or not the biological substance is located in the sensing region of the GCW sensor.